

# TECHNICAL NOTES

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRONOMY - 2

NATURAL RESOURCES CONSERVATION SERVICE  
OCTOBER 2003 (REVISED)

This STEEP paper by F. V. Pumphrey provides information on winter cover crops for wind erosion control on sandy soils in the Columbia and Yakima Basins. This agronomy technical note is renumbered from Technical Note – 14 July 1986.

## WINTER COVER CROPS FOR IRRIGATED SANDY SOILS IN THE COLUMBIA BASIN

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Key words: Wind erosion, cover crops, sandy soils, heat units, winter cereals, spring cereals, Austrian winter peas

### INTRODUCTION

Examination of the universal wind erosion equation,  $E = f(ICKLV)$  (Woodruff and Siddoway, 1965; Soil Conservation Service, 1984), provides insight into the importance of vegetative cover, V, for controlling wind erosion. Vegetation is the only factor in the equation which producers on the coarse sandy soils adjacent to the Columbia River can use to effectively minimize erosion. The amount of fine particles in the soil is so low that stable clods are not formed (Chepil, 1953) which eliminates using soil roughness, K, as a viable means of controlling wind erosion. Efficient use of large machinery requires large fields which is not compatible with having the L factor reduced to a non-erosive distance.

Growing cover crops and utilizing plant residues on the soil surface are the basic recommendations for controlling wind erosion (Mech and Woodruff, 1967; Siddoway et al., 1965; U.S. Department of Agriculture, 1983; Woodruff et al., 1977). Several reasons contribute to the limited use made of cover crops. Probably the primary reason for apathy by producers is failure to late fall planting to make adequate growth to protect the soil surface. The number of crops used successfully as cover crops remains very limited despite the fact that using cover crops is a rather ancient practice (Mech and Woodruff, 1967; Troeh et al., 1980; U.S. Department of Agriculture, 1938; Woodruff and Siddoway, 1965). To provide local observations and evaluations, recommended and suggested cover crops adapted to the Columbia Basin have been grown in the Hermiston, Oregon area.

### DISCUSSION

Living plants are more effective in reducing wind speeds at ground level than dead vegetation (Woodruff and Siddoway, 1965); thus, winter hardy cover crops are preferred to non-winter hardy crops (Table 1). Occasional winter days in the Lower Columbia Basin have temperatures high enough, above 3 0C (37 F), to promote growth if

winter hardy cereals. This over winter and early spring growth is most helpful in reducing wind erosion and recovery of wind and abrasion damaged plants. Non-winter hardy cereals are of less value than winter hardy cereals because of 1) the ease in which the winter killed vegetation is blown away and 2) the brittleness of the remaining vegetation. Brittle vegetation readily disintegrates and usually does not provide sufficient surface cover for wind erosion control even with conservation tillage seedbed preparation.

Differences exist between species selected for their potential to grow during the cooler part of the year (Table 1). These differences are magnified and become more important as daily temperatures become cooler as winter approaches. Establishment and growth are directly related to degree days accumulated after planting. Degree days needed for a specified amount of growth of winter cereals can be estimated from guidelines suggested by Rickman and Klepper, 1983. Degree days occurring after early October in the Hermiston area are sufficient for cereals and Austrian winter peas (Pisum sativum var. Arvense) to grow adequate ground cover (Table 2). Since heat is the driving force for plant growth, late planting will not have enough growth to provide ground protection; however, winter hardy cereals are superior in emergence and growth to non-winter hardy cereals when only minimal temperatures for growth are occurring.

The more upright growth habit of tillering winter wheat (Triticum aestivum) and winter barley (Hordeum vulgare) is preferred to the more prostrate growth habit of tillering rye (Secale cereale) and triticale (X Triticosecale). Wheat and barley pose less of a volunteer contaminate problem than rye and triticale. The cultivars most commonly grown for grain are suggested for using as cover crops. Using cereals as cover crop can perpetuate foot and root-rot diseases.

Seedlings of hairy vetch (vicia villosa) and smooth vetch (Vicia sativa) are delicate, fragile plants readily damaged by soil abrasion. Their growth response to temperatures of 3 to 8 C (37 to 46 F) is less than growth of winter wheat at these temperatures. The massive growth of hairy vetch often observed in May is misleading as to the amount of growth plants have during the cooler temperatures from late fall to early spring when the need for ground cover is most critical. Young plants of Austrian winter peas are more upright and sturdier than vetch seedlings.

An application of a contact herbicide is needed in the spring with conservation tillage seedbed preparation whether winter hardy or non-hardy crops are planted. This eliminates weeds and cover crops not killed by winter temperatures.

A rather unique method has developed for controlling wind erosion over winter and during spear cutting in sandy asparagus fields. Winter annual weeds, such as tumble mustard (Sisymbrium altissimum L.), shepard's purse (Capsella bursa-pastoris (L.) Moench.), and downy brome grass (Bromus tectorum L.), are allowed to grow between the rows and are clipped as needed to keep their growth within acceptable size for optimum asparagus production. Weeds within the asparagus rows are controlled with herbicides. Utilizing weeds that occur naturally has several special features such as 1) there are no costs for seed, seedbed preparation, and planting, 2) establishment and growth occur at minimum temperatures, and 3) loss of cover crop from winter killing is not a problem.

## SUMMARY

Winter wheat and winter barley are preferred cover crops to plant on the sandy irrigated soils in the Columbia Basin. These species have the greatest potential for rapid establishment and growth, are easily established in a broad range of planting conditions, and have minimal cost of seed which is readily available. Currently grown cultivars are recommended.

Austrian winter pea is the recommended non-cereal specie because of its greater growth in cooler weather, more upright growth habit, nitrogen fixing ability, and minimal possibility of escapes becoming pests. Combinations of crop residues, weeds, and cover crop provide more soil protection than cover crops alone.

The latest planting date after which adequate cover crop growth can be expected can be estimated from accumulated degree days. Accumulated degree days for a location can be assembled from daily air temperature records.

Table 1. Comments on species evaluated as cover crops, Hermiston, Oregon.

Common Name	Scientific Name	Comments
Winter Hardy Cereals		
Winter wheat	<i>Triticum aestivum</i> L.	Best Potential for species grown
Winter Barley	<i>Hordeum</i>	Not as winter hardy as winter wheat
Winter Rye	<i>Secale cereale</i> L.	Tillering habit more prostrate
Triticale	X <i>Tritiocoscale</i>	Winter hardy, prostrate
Rape	<i>Brassica napus</i> Var. <i>Annua</i> Kock	Early plantings provide ground cover; may have irregular stand establishment, damaged by abrasion, winter type reasonable winter hardy.
Annual Ryegrass Downy Brome grass	<i>Lolium Multiflorum</i> <i>Bromus tectorm</i> L.	Adequate growth when planted early; growth less than adequate when planted late, escapes become weed problems.
Downy Brome grass	<i>Bromus tectorm</i> L.	
Austrian winter pea	<i>Pisum sativum</i> Arvense L.	Best potential of legume growth with minimal temperatures, more upright growth habit than vetch.
Hairy vetch Smooth Vetch	<i>Vicia villosa</i> Roth <i>Vicia sativa</i> L.	Weak, delicate seedlings; slow emergence and growth when temperatures are cool, damaged by abrasion, hairy vetch more winter hardy than smooth vetch
Spring Cereals		
Oats Spring barley Spring wheat	<i>Avena sativa</i> L <i>Hordeum vulgare</i> L <i>Triticum aestivum</i> L	Early plantings have more upright growth than w. wheat; little growth from late plantings; winter killed plants brittle and easily blown away; not enough ground cover during transition to main crop

- Several cultivars and/or selections of each cereal grown.

Table 2. Growth rating of potential cover crops planted at three dates, Hermiston, Oregon.

Specie	Planting time		
	Early	Medium*	Late
Growth rating **			
Winter wheat	9	7	3
Winter Barley	9	7	3
Winter rye	8	6	3
Tricale	8	6	3
Spring oats	10	5	1
Spring Barley	10	6	1
Spring wheat	9	5	1
Annual ryegrass	5	2	1
Downy brome	5	2	1
Hairy vetch	6	3	0
Smooth vetch	6	3	0
Austrian winter pea	7	5	2

- Early, medium and late = first week in September, October, and November, respectively
- 10 = most abundant; 5 = adequate for wind erosion control; 0 = did not emerge